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SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			DANIELS, MATTHEW J	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/555,064	Applicant(s) AZAMI ET AL.
	Examiner MATTHEW J. DANIELS	Art Unit 1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 28 October 2005.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 9-12 is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-8 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date 10/28/05
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____
- 5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION

Lack of Unity

1. Restriction is required under 35 U.S.C. 121 and 372. This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-8, drawn to an apparatus (class 372).

Group II, claim(s) 9-12 drawn to a process (264/482).

2. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: claims 1 and 9 recite the special technical feature that a rod-shaped graphite target is irradiated with light while moving the position to vaporize carbon vapor and create nanocarbons which are collected. However, Iijima (*Chemical Physics Letters*, Vol. 309 (1999) pages 165-170) teaches a nanocarbon production apparatus comprising a target holding unit which holds and rotates a rod-shaped graphite target (page 166, left col., lines 10-20), a laser light source which irradiates a surface of said graphite target with light (page 166, left col., lines 16-20), a moving unit which moves said graphite target held by said target holding unit relative to the light source to move an irradiation position of said light in the surface of said graphite target (page 166, left col., line 16); and a collecting unit for collecting nanocarbon evaporated from the graphite target by irradiation with light (filter, page 166, left

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col., lines 21-27). Thus, in view of the Iijima reference, the special technical feature does not provide a contribution which both inventions make over the prior art. In view of the foregoing, the inventions lack unity.

3. Restriction for examination purposes as indicated is proper because all these inventions listed in this action lack unity for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

4. **Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.**

5. The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically

point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention.

6. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

7. Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

8. During a telephone conversation with Toni Lawson on 2 July 2008, calling on behalf of Howard Bernstein, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-8. Affirmation of this election must be made by applicant in replying to this Office action. Claims 9-12 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

9. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10. Claims 1-8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7 of copending Application No. 10/568386. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Instant Claim 1 recites a target holding unit for a sheet-like or rod-shaped graphite target, a light source to irradiate the target, a moving unit, and a collecting unit. However, Claim 1 of the '386 application also recites a target holding unit, a light source, a moving unit, and a recovery or collecting unit. While Claim 1 of the '386 application does not expressly disclose a sheet-like or rod-shaped target, these aspects of the invention are claimed in claims 2 and 3. As

to instant Claims 2-8, since the same sheet-like and rod-like holder is claimed in the '386 application, it is submitted that the structure would have inherently fulfilled the limitations of instant Claims 2-8 which require particular methods of operating the structure already claimed. Additionally, the constant irradiation angle of Claim 2 is claimed in Claim 5 of the '386 application. The graphite target disappearance of Claim 3 would be implicit in the target holder having rollers recited in Claim 3 of the '386 application. The power density is not claimed as variable in the '386 application, and therefore the limitations of instant Claim 4 would have been obvious over claims of the '386 application since a constant value would have been obvious. As to Claims 5-7, the roller configuration of Claim 3 of the '386 application would have provided the claimed limitations of Claims 5 and 6 because a moving unit could be operated to rotate between rollers or to reel out target material. As to Claim 8, the material produced does not materially affect the apparatus, but nevertheless it is submitted that the "assemblies" of Claim 7 of the '386 application would render obvious the claimed "aggregates."

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

11. Claims 1-5 and 8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 2 of copending Application No. 10/566,579 in view of Iijima (Chemical Physics Letters, Vol. 309 (1999) pages 165-170). Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Instant Claim 1 recites a target holding unit for a sheet-like or rod-shaped graphite target, a light source to irradiate the target, a moving unit, and a collecting unit. However, Claims 1 and 2 of the '579 application also recites a light source, and a recovery or collecting unit. Additionally, Iijima teaches a nanocarbon production apparatus comprising a target holding unit which holds and rotates a rod-shaped graphite target (page 166, left col., lines 10-20), a laser light source which irradiates a surface of said graphite target with light (page 166, left col., lines 16-20), a moving unit which moves said graphite target held by said target holding unit relative to the light source to move an irradiation position of said light in the surface of said graphite target (page 166, left col., line 16), and a collecting unit for collecting nanocarbon evaporated from the graphite target by irradiation with light (filter, page 166, left col., lines 21-27). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Iijima into that of the '579 application because the Iijima reference represents improvements which would have also been desirable in the '579 application, and therefore one would have found it obvious to provide the same improvements in the '579 application to achieve the same benefits. As to instant Claims 2-5 and 8, since the same rod-like holder is claimed in the Iijima reference, it is submitted that the structure would have inherently fulfilled the limitations of instant Claims 2-4 and 8 which require particular methods of operating the structure already claimed.

12. Claims 1-4 and 8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, 16, 18 of copending Application

No. 10/560,593. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Instant Claim 1 recites a target holding unit for a sheet-like or rod-shaped graphite target, a light source to irradiate the target, a moving unit, and a collecting unit. However, Claims 1, 4, and 8 of the '593 application also recites a target holding unit, a light source, a moving unit, and a recovery or collecting unit. While Claim 1 of the '593 application does not expressly disclose a sheet-like or rod-shaped target, the rod target is claimed in Claim 8 of that application. As to instant Claims 2-4 and 8, since the same rod-like holder is claimed in the '386 application, it is submitted that the structure would have inherently fulfilled the limitations of instant Claims 2-4 and 8 which require particular methods of operating the structure already claimed. Additionally, as to Claims 2 and 4, the '593 application does not require adjustment of the irradiation angle or the power density, and therefore it is submitted that it would have been obvious to keep these conditions constant during the process. As to Claim 3, the rotating rod of Claim 8 would provide a spot which disappears in the claimed manner. As to Claim 8, see Claim 9 of the '593 application.

13. Claims 1-4 and 8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-6 and 8-15 of copending Application No. 10/556,088. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Instant Claim 1 recites a target holding unit for a sheet-like or rod-shaped graphite target, a light source to irradiate the target, a moving unit, and a collecting unit. However, Claims 1 and

15 of the '088 application also recites a target holding unit, a light source, a moving unit, and a recovery or collecting unit. While Claim 1 of the '088 application does not expressly disclose a sheet-like or rod-shaped target, the rod target is claimed in Claim 15 of that application. As to instant Claims 2-4 and 8, since the same rod-like holder is claimed in the '088 application, it is submitted that the structure would have inherently fulfilled the limitations of instant Claims 2-4 and 8 which require particular methods of operating the structure already claimed. Additionally, as to Claims 2 and 4, the '088 application does not require adjustment of the irradiation angle or the power density, and therefore it is submitted that it would have been obvious to keep these conditions constant during the process. As to Claim 3, the rotating rod of Claim 15 of the '088 application would provide a spot which disappears in the claimed manner. As to Claim 8, the '088 application would inherently be capable of forming aggregates in the claimed manner.

14. Claims 1-4 and 8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-6 and 8-15 of copending Application No. 10/544,400. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Instant Claim 1 recites a target holding unit for a sheet-like or rod-shaped graphite target, a light source to irradiate the target, a moving unit, and a collecting unit. However, Claim 1 of the '400 application also recites a target holding unit, a light source, a moving unit, and a recovery or collecting unit. As to instant Claims 2-4 and 8, since the same rod-like holder is claimed in the '400 application, it is submitted that the structure would have inherently fulfilled the limitations of instant Claims 2-4 and 8 which require particular methods of operating the

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structure already claimed. Additionally, as to Claims 2 and 4, the ‘400 application does not require adjustment of the irradiation angle or the power density, and therefore it is submitted that it would have been obvious to keep these conditions constant during the process. As to Claim 3, the rotating rod of Claim 2 of the ‘400 application would provide a spot which disappears in the claimed manner. As to Claim 8, the ‘400 application would inherently be capable of forming aggregates in the claimed manner.

15. Claims 1-4 and 8 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-6 and 8-15 of copending Application No. 10/544,133. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons:

Instant Claim 1 recites a target holding unit for a sheet-like or rod-shaped graphite target, a light source to irradiate the target, a moving unit, and a collecting unit. However, Claims 2 and 3 of the ‘133 application also recite a target holding unit for a sheet or rod which also functions as a target moving unit, a light source, and a recovery or collecting unit. As to instant Claims 2-4 and 8, since the same holder is claimed in the ‘133 application, it is submitted that the structure would have inherently fulfilled the limitations of instant Claims 2-4 and 8 which require particular methods of operating the structure already claimed. Additionally, as to Claims 2 and 4, the ‘133 application does not require adjustment of the irradiation angle or the power density, and therefore it is submitted that it would have been obvious to keep these conditions constant during the process. As to Claim 3, the rotating rod of Claim 2 of the ‘133 application would

provide a spot which disappears in the claimed manner. As to Claim 8, the '133 application would inherently be capable of forming aggregates in the claimed manner.

Claim Objections

16. Claims 1-8 are objected to because of the following informalities:

Claim 1 does not end with a period

Claim 3 is unclear because it ends with "said graphite target".

The phrase "while rotates said rotating body" is unclear.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

17. **Claims 1, 2, 5, and 8** are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Iijima (Chemical Physics Letters, Vol. 309 (1999) pages 165-170). **As to Claim 1**, However, Iijima teaches a nanocarbon production apparatus comprising a target holding unit which holds and rotates a rod-shaped graphite target (page 166, left col., lines 10-20), a laser light source which irradiates a surface of said graphite target with light (page 166, left col., lines 16-20), a moving unit which moves said graphite target held by said target holding unit relative to the light source to move an irradiation position of said

light in the surface of said graphite target (page 166, left col., line 16), and a collecting unit for collecting nanocarbon evaporated from the graphite target by irradiation with light (filter, page 166, left col., lines 21-27). Although Iijima does not specifically teach that a target holding unit and moving unit are present, because Iijima teaches that the target is rotated and advanced, it would have been inherent that target holding unit and moving unit are present. In the alternative, however, it would have been obvious to provide a target holding unit and moving unit in view of Iijima's clear suggestion to provide rotating and moving actions. **As to Claims 2 and 5**, it is submitted that because Iijima advances the graphite rod along its axis without any description of changing the irradiation angle, that it would have been inherent that a moving unit which moves the graphite in a translational manner was present. In the alternative, Iijima clearly suggests advancing the graphite while rotating it, thus suggesting that a translational moving unit should be used. **As to Claim 8**, it is submitted that in an apparatus claim, the material produced by the apparatus should be given little patentable weight. However, Iijima teaches nanohorn aggregates (title).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. **Claims 3 and 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iijima (Chemical Physics Letters, Vol. 309 (1999) pages 165-170) in view of Wiler (US 5478426). Iijima teaches the subject matter of Claim 1 above under 35 USC 102(b), or in the alternative, under 35 USC 103(a). **As to Claim 3**, Iijima provides a disappearing graphite, referred to by Iijima as laser ablation (page 166, left column). Iijima is silent to the moving unit moving the irradiation position of the light. Iijima appears to disclose a stationary beam and rotating target. However, use of a stationary target and a rotating beam would have been an obvious substitute or alternative since doing so would provide the same action, namely exposure of fresh material to the laser beam. For example, Wiler teaches that it is known to provide a technique similar to Iijima where the target is rotated and ablated with a stationary beam (Fig. 6), and in the alternative, to use a target with a robotically controlled laser (Fig. 8) such that the laser can be impinged on nearly any surface of the article (8:47-61). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the apparatus of Wiler into that of Iijima because (a) Iijima suggests that it is desirable to continuously expose new target material to the laser, and Wiler teaches a system which would provide the suggested capability, or (b) one of ordinary skill in the art at the time of the invention would have viewed the Wiler apparatus as a substitutable laser ablation control system for the Iijima apparatus which provides the additional benefits of computer control of laser movement, laser power, and target movement. **As to Claim 4**, in the Iijima apparatus which has the capability to rotate, advance, and ablate the graphite target, because the rotation is controlled to 6 rpm (page 166, left col.) and there is no suggestion to change the power density, it is submitted that the claimed apparatus is provided. In the alternative that the constant rotation of the target of Iijima cannot be considered

to teach or suggest a control unit and constant power density, Wiler teaches that movement of the target or the laser and the laser power are controlled by a control unit (a microprocessor, 7:2-28), and thus they have the claimed capabilities. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the apparatus of Wiler into that of Iijima for the reasons set forth above with respect to Claim 3.

19. **Claims 6 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Iijima (Chemical Physics Letters, Vol. 309 (1999) pages 165-170) in view of Davanloo (US 5411797). Iijima teaches the subject matter of Claim 1 above under 35 USC 102(b), or in the alternative, under 35 USC 103(a). **As to Claim 6**, Iijima is silent to the belt device. However, Davanloo teaches that it is known to provide a sheet-like graphite target and rotating it with rolls (9:38-63). Davanloo meets the structural limitations of the two rolls, and one of ordinary skill would have found it obvious to use a continuous belt around the two rolls of Davanloo instead of the roll-to-roll configuration since a belt is a continuous embodiment of a reel-to-reel configuration. One would have found it obvious to provide a continuous belt since doing so would provide the ability to operate continuously without changing or rewinding the belt of Davanloo. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Davanloo into that of Iijima because (a) Iijima suggests using a graphite target that advances (page 166, left column) and Davanloo teaches a graphite target which advances to provide fresh target material to the laser beam, which avoids cratering in the target and a reduction in power density (Davanloo, 9:51-55), or (b) Iijima suggests a target which advances and Davanloo teaches a target which advances in a different way for substantially the

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same purpose such that one of ordinary skill in the art would view the Davanloo target to be a substitutable element for that of Iijima. **As to Claim 7**, Davanloo teaches a sheet-like graphite target wound about a rotating body (Fig. 1, items 32 and 34). Since the rotating body rotates, it would be configured to push out the graphite target released from the rotating body toward the direction of the irradiation position.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. DANIELS whose telephone number is (571)272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew J. Daniels/
Primary Examiner, Art Unit 1791
9/28/08